

SDSS II SN Development/Operations

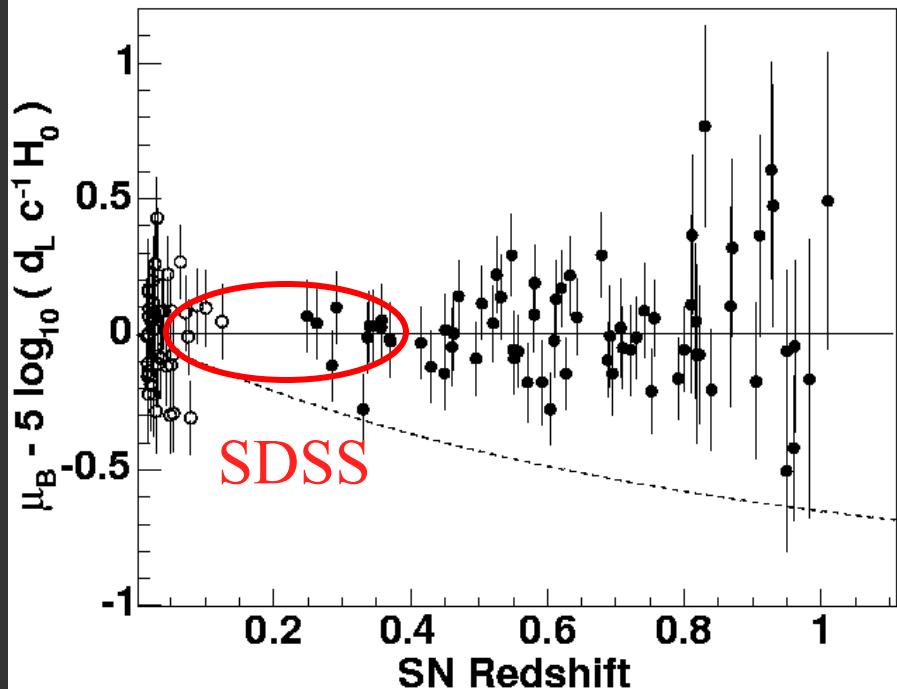
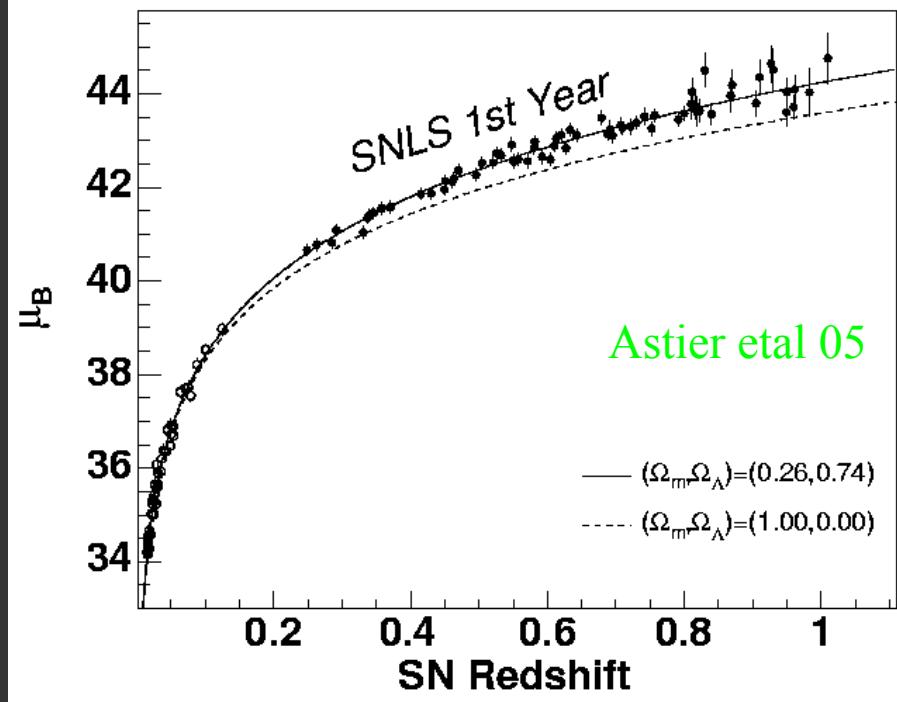
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Portsmouth: R. Nichol, M. Smith NMSU: J. Holtzman, T. Gueth
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K. van den Heyden (SAAO),
L. Wang (LBL), R. Foley (UCB), A. Filippenko (UCB)
Additional collaborators on spectroscopic follow-up
graduate student undergraduate

Science Goals:

- Fill in 'redshift desert' w/ ~ 200 well-measured lightcurves at $z \sim 0.05-0.35$
- Probe Dark Energy in z regime complementary to deeper surveys
- Study SN Ia systematics with excellent SDSS photometry
- Determine SN rates/properties
- Rest-frame u -band templates for $z > 1$ surveys
- Database of Type II and rare SN light-curves (large survey volume)

Method:

- Repeat imaging of stripe 82, Sept-Nov. alternate 82N and 82S
- On-mountain frame subtraction
- Follow-up spectroscopy (& imaging) elsewhere

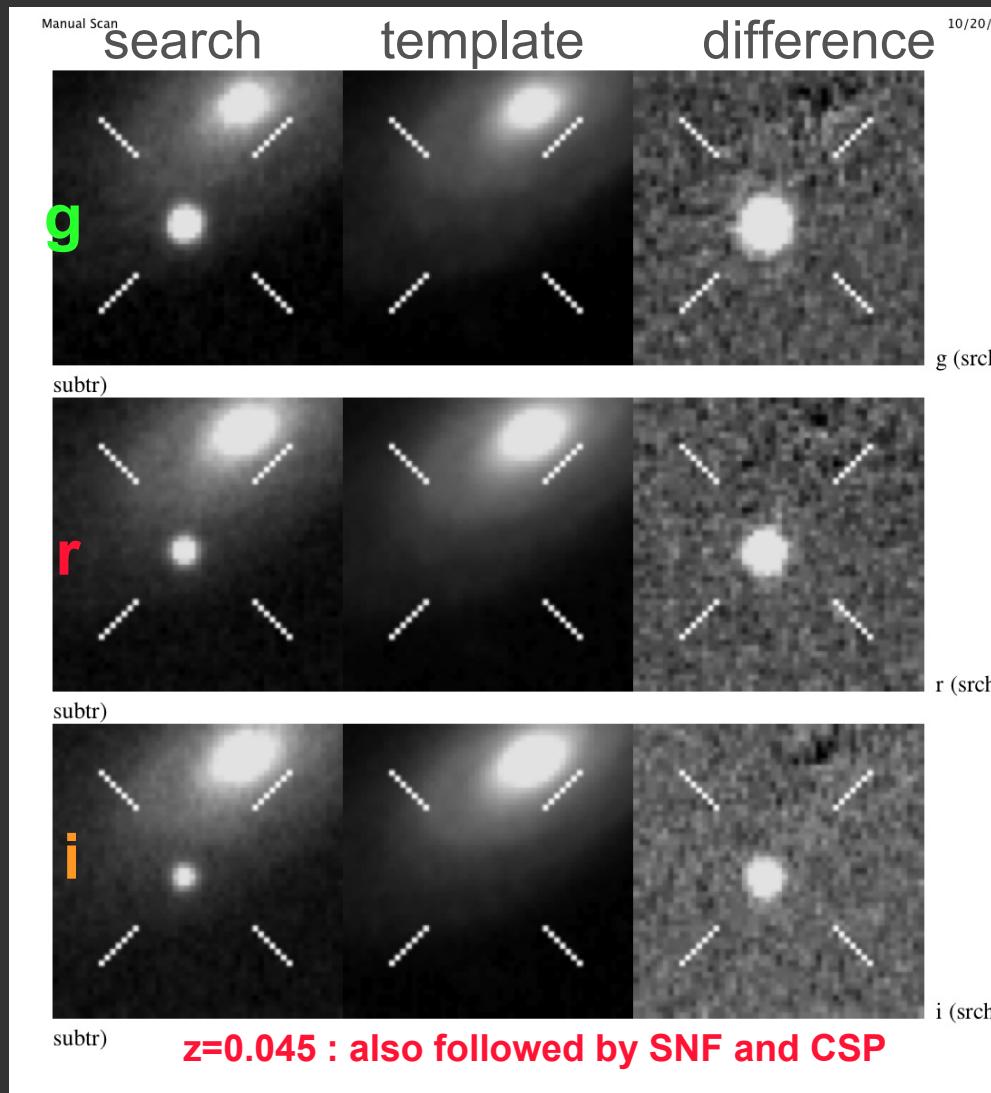


Improvements for 2005 Run (from 2004 Test Run):

- Development Highlights:
 - Frame subtraction: improved diagnostics, remapping, masked pixels, PSF determination (from PHOTO), convo finding; use co-added template images, added i band
 - Database: improved veto & star catalogs
 - ‘real-time’ efficiency tests with artificial SNe in data
 - Multi-color SN target selection using multi-band light fitting with and without host photo-z or spectro-z
 - Web interface for human scanning of SN candidates
 - Public webserver & CBET circulars for confirmed candidates
- Hardware: 10 dual processors at APO: process gri in \sim 20 hrs
- Much more extensive follow-up program
- More experienced team w/ a few new faces



Scan Example



To appear on scan-page requires the difference image for at least two filters to have $S/N > \sim 3$ and to be within $0.6''$.

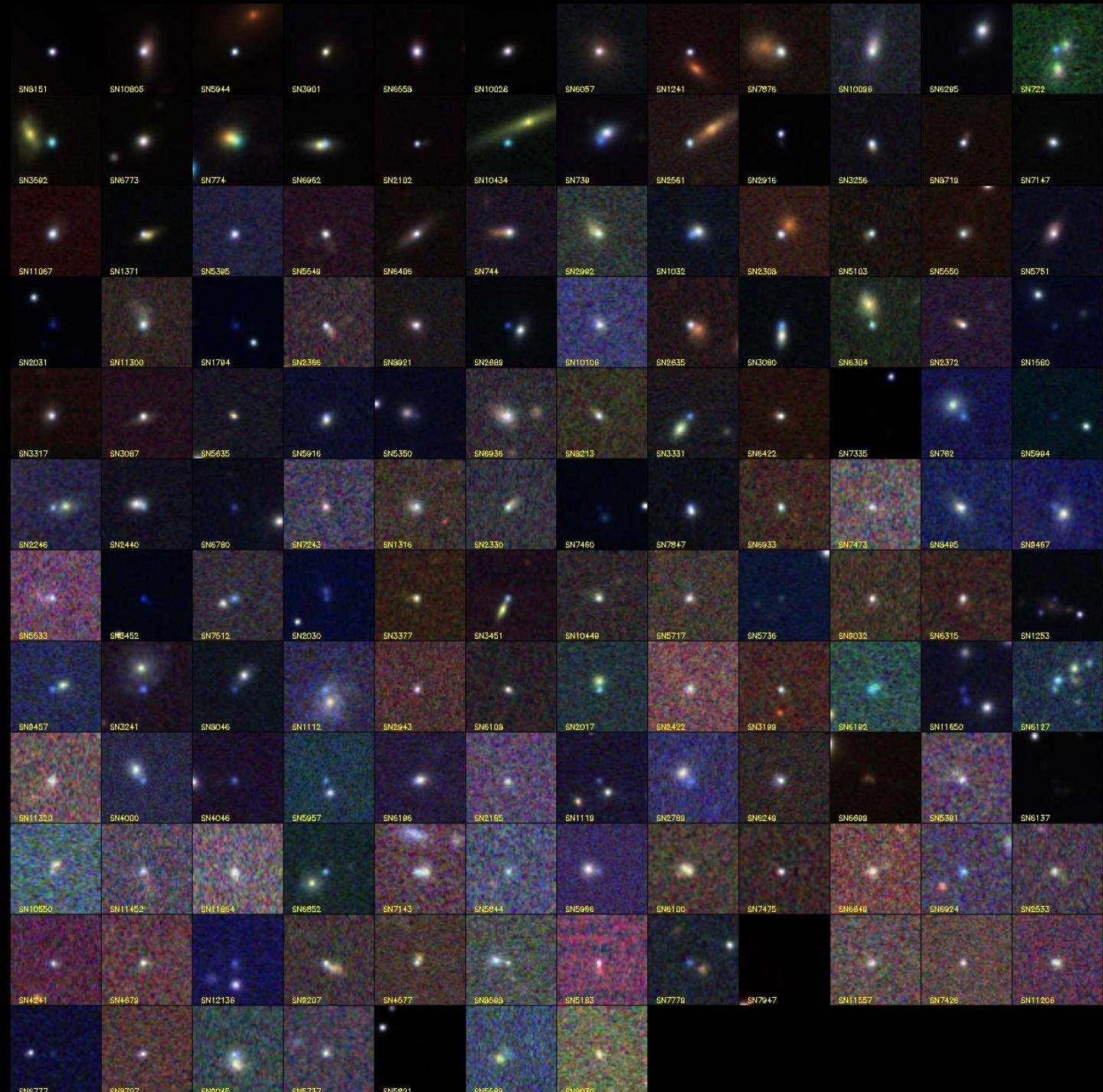
Fall 2005:
~130
spectroscopically
confirmed
Type Ia's

14 spectroscopically
likely/possible Ia

11 confirmed SN II

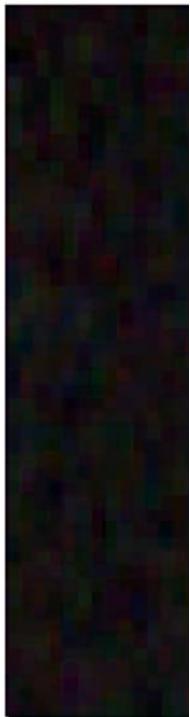
6 confirmed Ib/c

~100's of
unconfirmed Ia's
based on light
curves



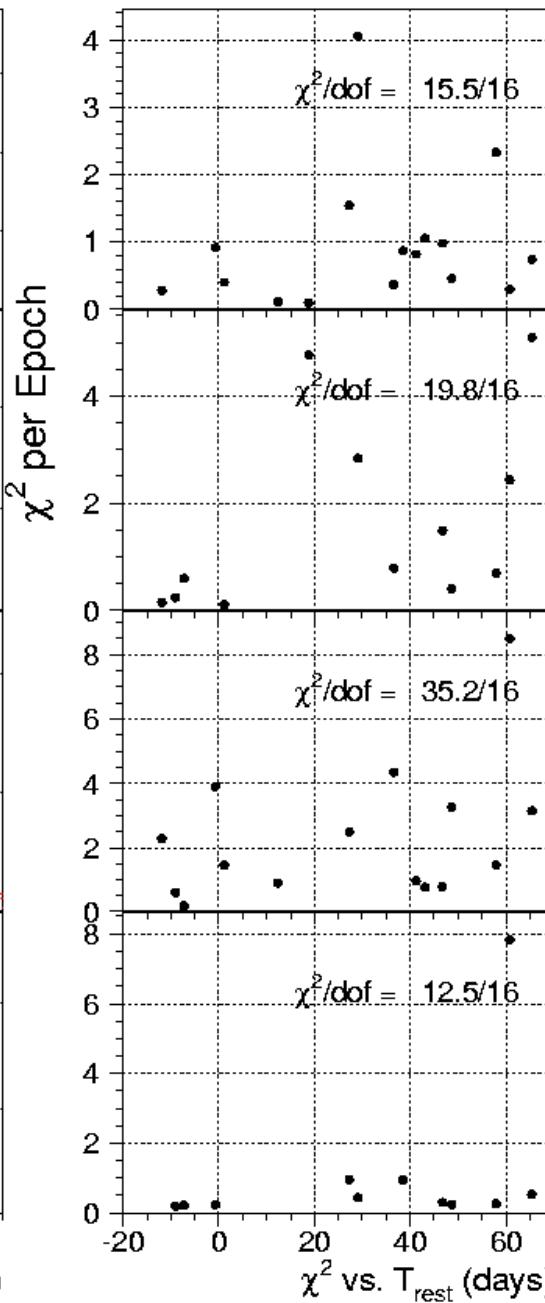
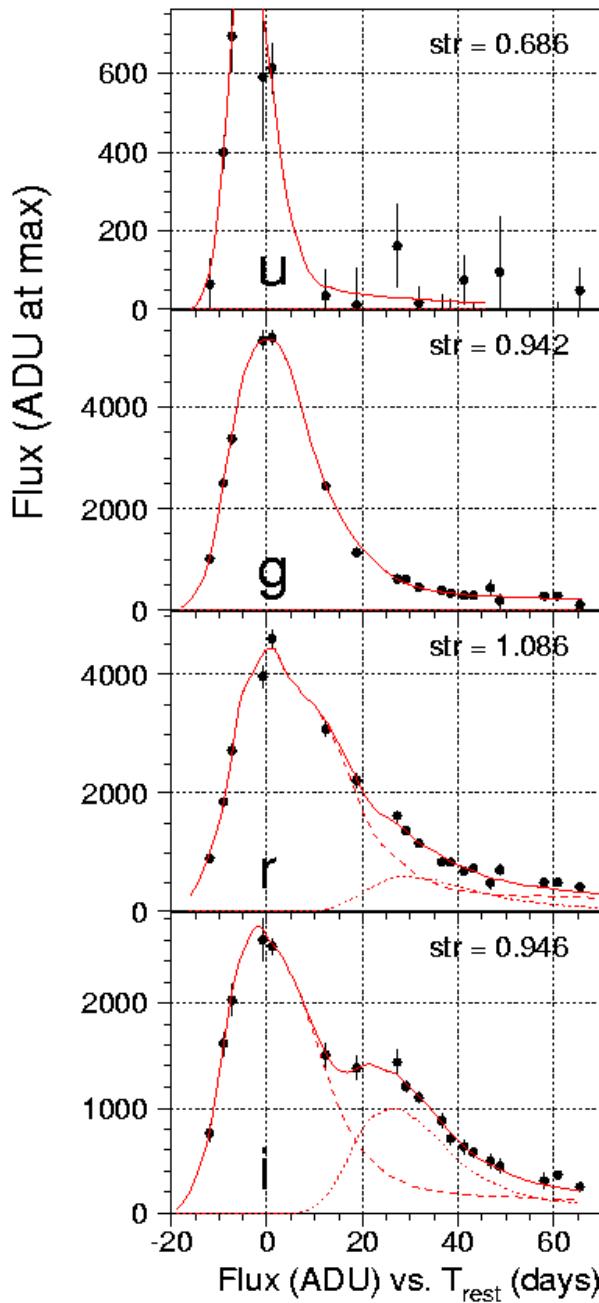
Composite images

Befo



Pre

V002 SN1241 $z=0.072$ $A_V=0$ ugr-i-band



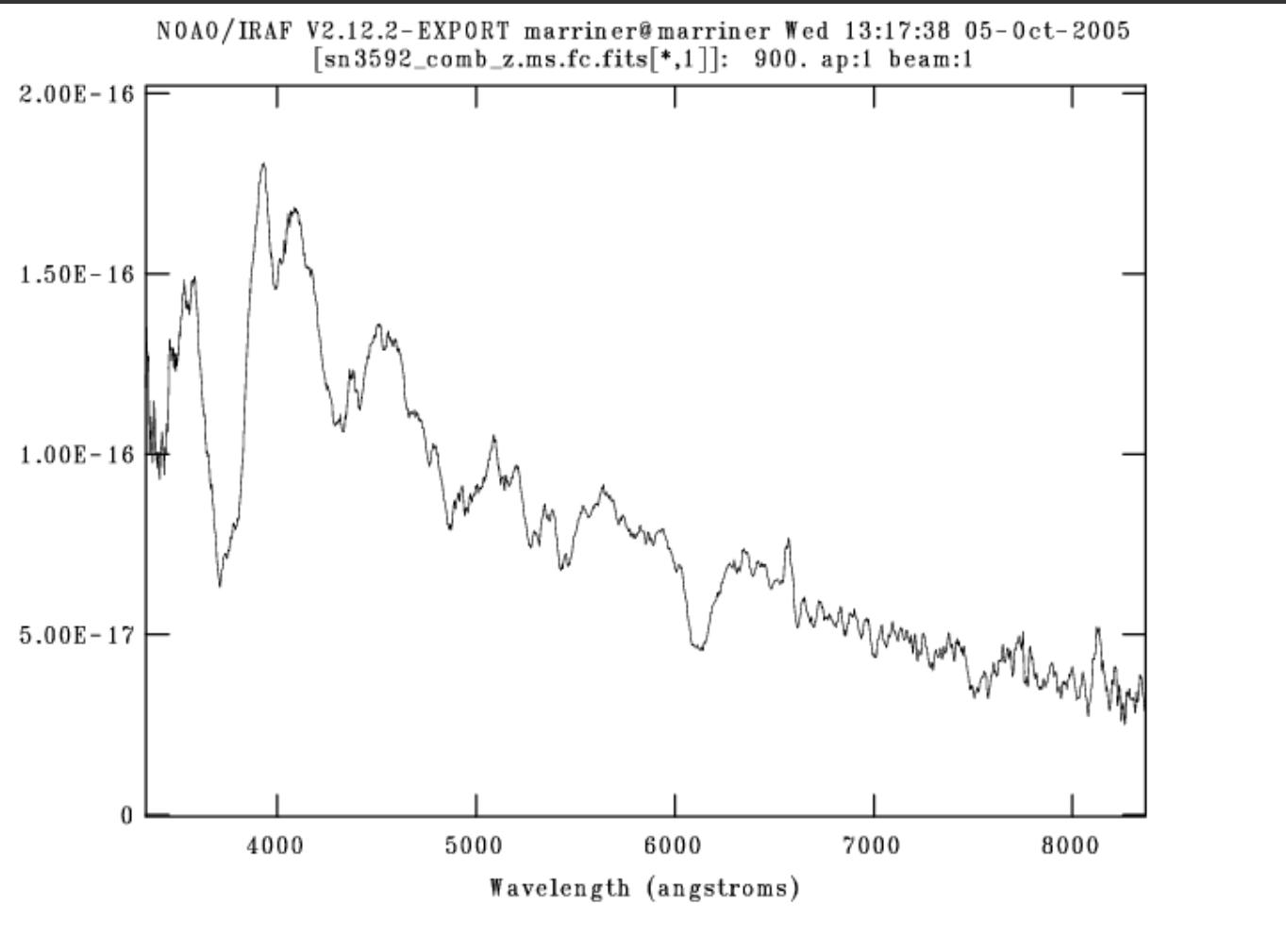
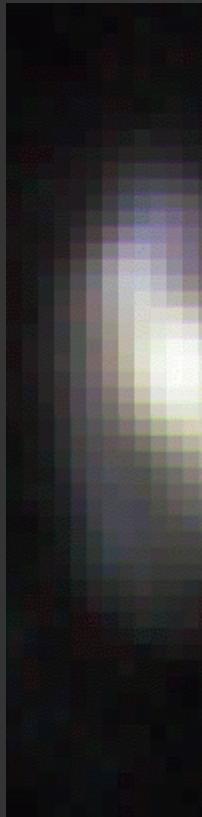
es



Composite gri images

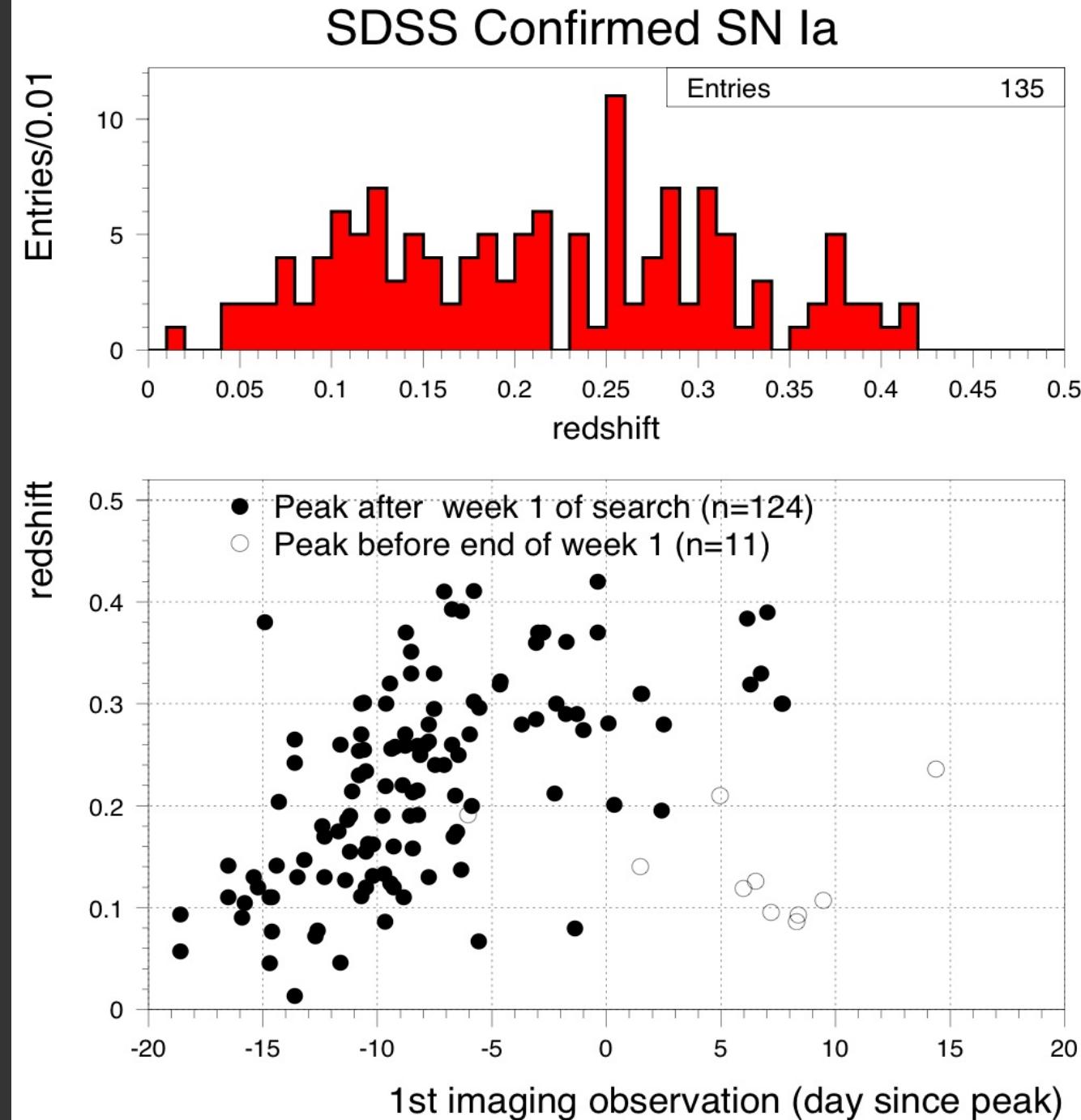
SN 2005 gb

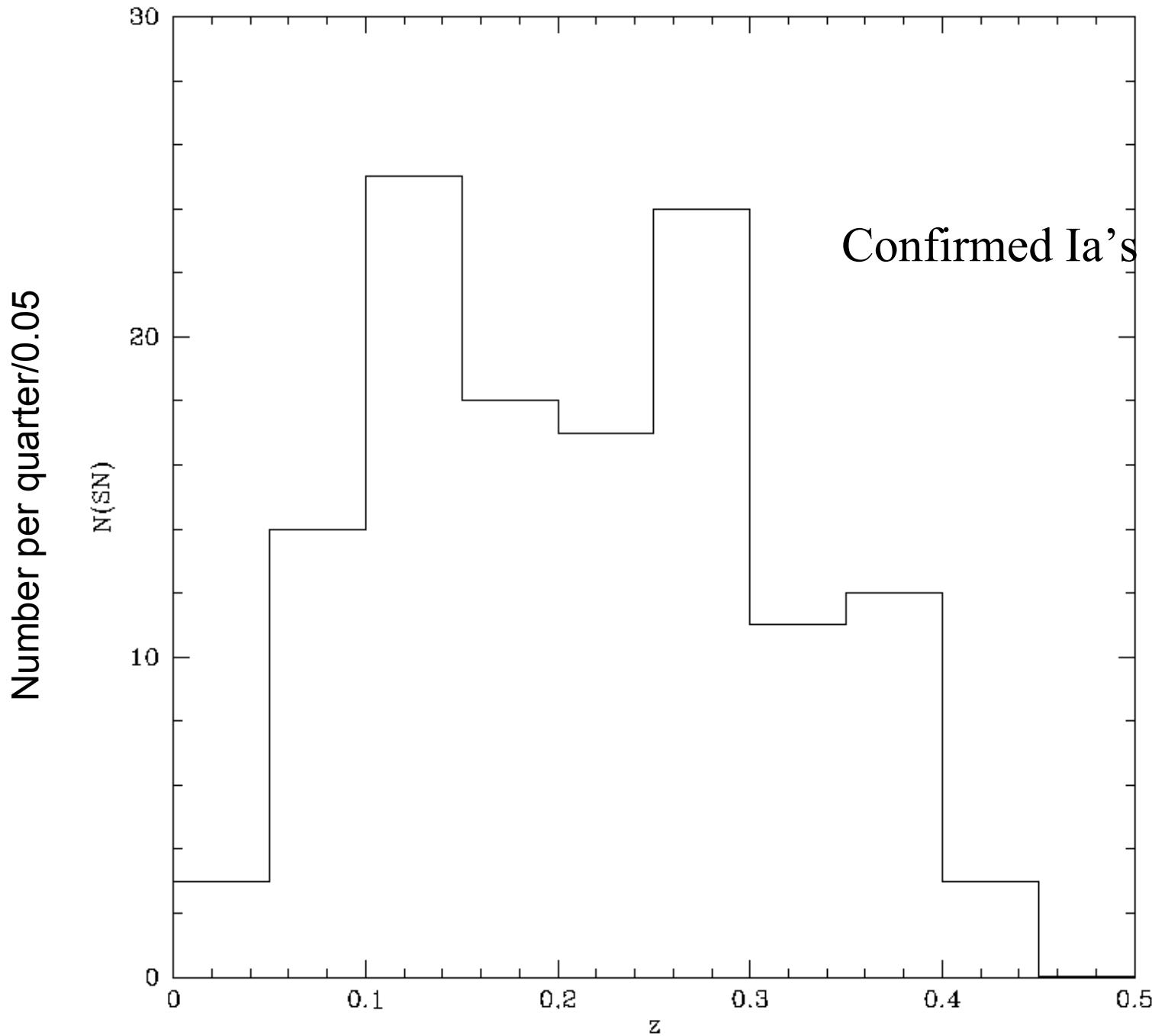
Be



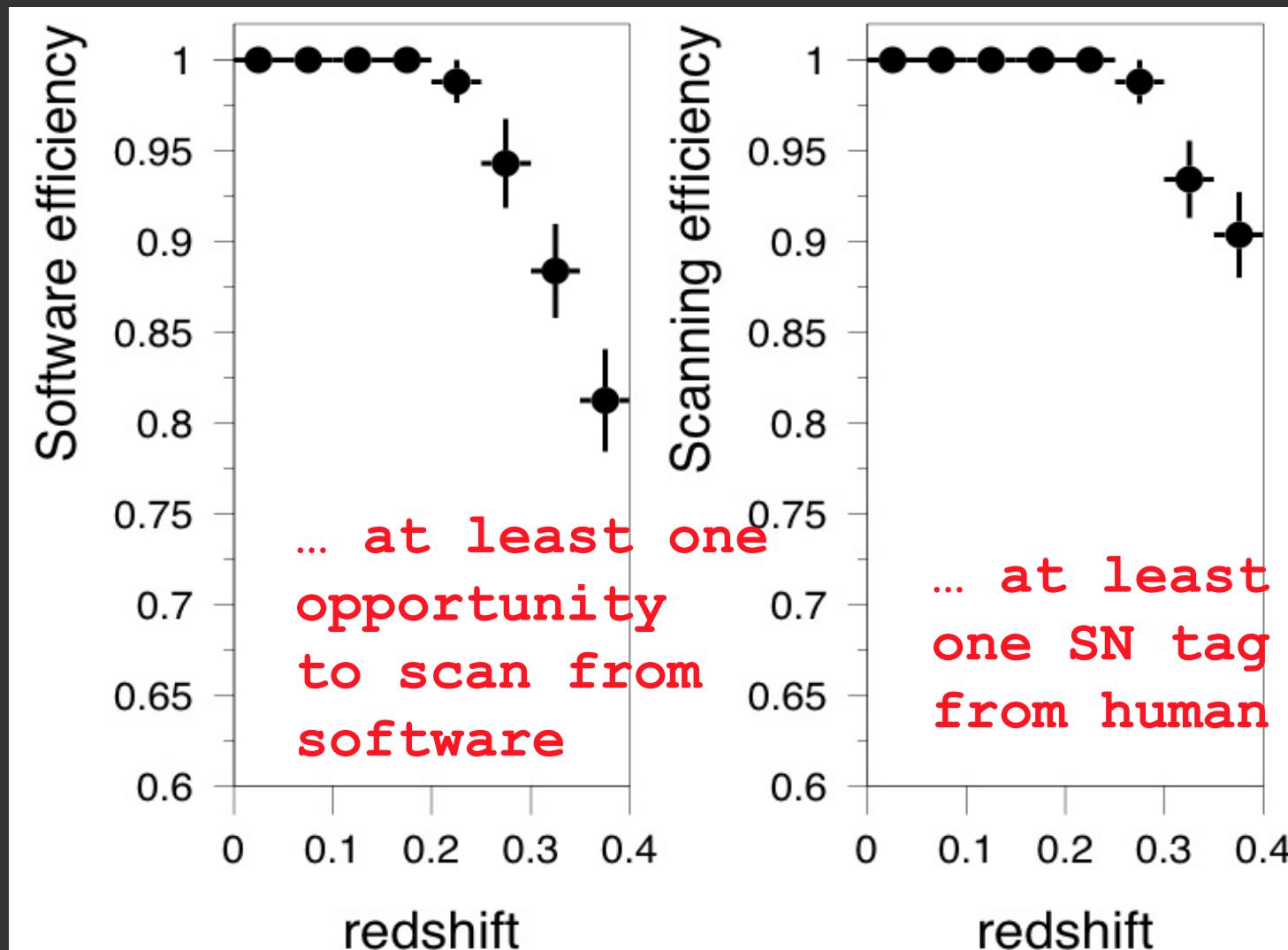
$z = 0.086$, confirmed at ARC 3.5m
Preliminary gri light curve and fit from low-z templates

Finding
Supernovae
Before
Peak Light:
important
for good
Peak Mag
estimate





Efficiency Estimate Using Fake SNe Inserted into Data Stream



SDSS II SN Follow-up 2005

- Spectroscopy: mainly SN typing, redshift
- NIR imaging: extinction/reddening and low-z light curves
- Optical imaging: follow high-z light curves beyond SDSS limit
- Spectroscopy: ARC 3.5m (31 half-nights), HET (~90 hrs), MDM 2.4m (~37 nights), Subaru (share 6 nights), WHT (6 nights), Keck (opportunity, 1 night)
~290 spectra taken
- NIR imaging: Carnegie Supernova Project (selected targets)
- Optical imaging: NMSU 1m, MDM, UH 88in (6.5 nights), VATT (7 nights), WIYN (3 nights shared), INT (1 night), Liverpool Telescope (4 hours), CSP low-z

Status and Plans

- First Analyses:
 - Light curve fitting (several methods) + Hubble diagram
 - Individual peculiar SNe (2005hk, 2005gj)
 - SN Ia rate at $z < 0.15$
- 2006 Team meetings: Stanford, Santa Fe, Fermilab,...
- Aiming for first pubs by Jan. 2007 AAS Special Session
- Plans for Fall 2006 Survey:
 - Upgrade search algorithm to reduce human scan load
 - Real time public alert webpage (and VOEvent)
 - Increase multi-epoch, non-Ia, and mid-z follow-up spectroscopy
 - Follow-up spectroscopy scheduled: ARC, MDM, HET,
Subaru, NTT (similar amount to 2005)